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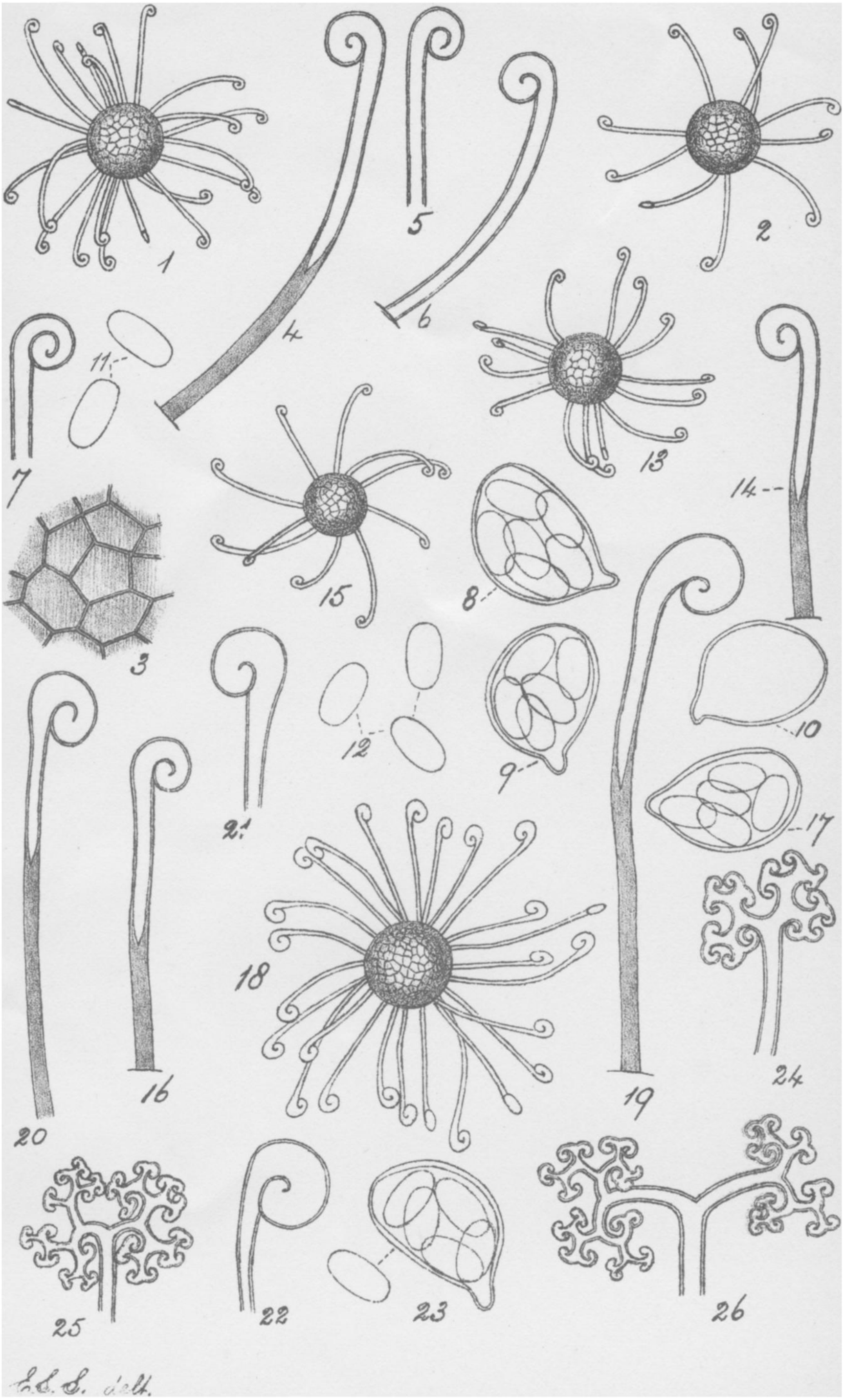

THE HELIOTYPE PRINTING CO., BOSTON.

The Erysiphaceae cf Japan

By Ernest S. Salmon

(With Plate 26)

During the past eighteen months I have received from Prof. Kingo Miyabe, of the Sapporo Agricultural College, Japan, a large and well-preserved collection of Japanese Erysiphaceae, numbering 200 specimens. Most of this material is mentioned in my "Monograph of the Erysiphaceae" (3), but some of Professor Miyabe's specimens arrived too late to be included. I have also received subsequently 15 specimens from Prof. Shotaro Hori, of the Nishigahara Exper. Station, Tokio. Further, two articles have lately appeared dealing with Japanese mildews: one by H. & P. Sydow (1), in which a supposed new species of *Uncinula*, *U. Kusanoi*, is described; the other by P. Hennings (2), in which "*Phyllactinia suffulta* var. *moricola*" and "*Microsphaera Japonica*" appear. Dr. Hennings has very kindly sent me specimens of the two latter plants, and included also with them specimens of three more species from Japan under the Mss. names of *Uncinula verniciferae*, *U. Shiraiana* and *Microspharea sambucicola*. Dr. Hennings informed me that the description of these species was already in the printer's hands, and kindly gave me permission to mention them in this paper.

To Prof. K. Miyabe and Prof. S. Hori I beg to express my thanks for the valuable material (now in Kew Herbarium) sent by them; also to Mr. P. Sydow for a specimen of *Uncinula Kusanoi*.

Before giving a full list of the species (with their host-plants and localities), known to me from Japan, a few remarks are necessary on these lately published species.

U. Kusanoi H. & P. Syd. (on *Celtis Sinensis* Pers.). Meguro pr. Tokio (leg. Kusano), has perithecia from 80–110 μ in diameter, cells of the outer wall 15–20 μ wide, appendages 10–20, usually slightly exceeding the diameter of the perithecium, but varying from 1–1 ½ times its diameter, often unequal in length on the same perithecium, simply uncinate at the thin-walled hyaline apex, becoming thick-walled, refractive, and often rough in the lower half, 5–6 μ wide below, 17–20 μ wide across the apex; asci 3–4, rarely 5, broadly ovate to subglobose, 45–52×35–40 μ, very shortly stalked, spores crowded, 4–6, or rarely 7, usually 6, 21–24×10–12. (See Figs. 1–12.) The authors remark (1) of the plant, "Mit keiner der bisher auf *Celtis* bekannten *Uncinula*-arten zu identifiziren"; and it is quite true that the present fungus is distinct from *U. polychaeta*, *U. parvula* and *U. confusa*. But after careful comparison I am unable to separate "*U. Kusanoi*" from *U. Clintonii* Peck. At first sight *U. Clintonii* (in perhaps its commonest form) appears distinct in the larger perithecia with more numerous longer appendages, large and more numerous asci, and especially in the much enlarged clavate apex of the appendages, often measuring 30 μ across (see Figs. 18–23). But, as I have previously pointed out (3) the enlarged apex of the appendages cannot be considered as a constant character of *U. Clintonii*. In two interesting examples of the species—one from Crawfordsville, Indiana (E. M. Fisher, Oct., 1890. Ex. Herb. U. S. Dept. Agric., no. 1055), the other from Washington, D. C. (P. Magnus, Oct., 1897) (see Figs. 13–17), we find the perithecia exhibiting all the characters of the Japanese plant.

The perithecia of these American specimens are equally small (in one case the diameter was only 70 μ) the appendages are as few, with the apex measuring 20 μ across; and the number and size of the asci and spores are the same. Until lately *U. Clintonii* had been supposed to be confined to the United States (where it is not uncommon, on the single host-plant *Tilia Americana*, in the Eastern States), but, as I have already recorded (3), two Japanese examples of a fungus on *Zelkova acuminata* and *Aphananthe aspera* sent to me by Professor Miyabe, although differing slightly from the American forms of *U. Clintonii*, approached so closely to this species as to be unable to be separated. The discovery in Japan of a form of *U. Clintonii* on *Celtis Sinensis* agreeing exactly with certain American examples on *Tilia Americana* is therefore very interesting. I have received the present species (on *Celtis Sinensis*) from Prof. S. Hori (Tokio, Akabane, Oct. 15, 1899; coll. Nishida & Nambu).

Phyllactinia suffulta var. *moricola* P. Henn. Following the description the author remarks: "Diese Varietät ist von der Typischen Art schon äusserlich durch das dickfilzige, weisse bis gelbliche Mycel gut verschieden." In the specimen sent (on *Morus alba*, Tokio, leg. Miyoshi), the mycelium is persistent in a thin effused coat, but, as I have already shown (3), it isimpossible to regard the persistence or evanescence of the mycelium in the Erysiphaceae as a systematic character of the first importance. In certain examples of *P. corylea* (*P. suffulta*) on *Corylus* from Europe, and on *Quercus* from North America, the mycelium is frequently persistent just as in the Japanese plant, but no characters are shown of sufficient weight to separate the plants in any way from the type. It is interesting to find that in a specimen of *P. corylea*, sent to me by Professor Miyabe, on the same host (*Morus alba*) fromSapporo (E. Tokubuchi) the mycelium is perfectly evanescent. *Microsphaera sambucicola* P. Henn. ("on *Sambucus*, Japan") is *M. grossulariae*. This is the form of the species which was described by Gerard, from American specimens on *Sambucus Canadensis*, as *M. Van Bruntiana*, but which has been correctly referred to *M. grossulariae* by Burrill (Ell. & Everh. N. Amer. Pyren., p. 24).

Microsphaera Japonica P. Henn. (on *Cornus macrophylla*, Tokio). The author remarks (2) " Die Art ist von *M. pulchra* C. et Peck durch 8-sporige, eiförmige Asken durch die spitzen Enden der Anhängsel u. s. w. verschieden, derselben aber nahe stehend." I have already (3) referred this Japanese plant to *M. alni*, and also shown that "*M. pulchra*"—which is a more extreme form than the present plant cannot possibly be maintained as distinct. From the description given in the diagnosis (2) it would appear that the appendages were observed in an immature condition. The apex of a mature appendage is shown at Fig. 24. Comparison of this figure with those I have given (3) of the appendages of *M. alni* will show the identity of the Japanese plant.

Uncinula Shiraiana P. Henn. (on *Celtis Sinensis*, Tokio) is *U. polychaeta*. I had already seen examples of this fungus on the same host from Tokio, Sugamo (S. Hori). In these latter specimens the asci are 2-, or more often 3-spored, in Dr. Hennings' plant the asci are usually 3-spored, sometimes 2- or 4-, or very rarely 5-spored. In examples of the species from America the spores are almost constantly 2 in number, and the peculiarity of the

Chinese and Japanese specimens in having usually more spores has already been remarked (3). Tracy and Galloway, however, have recorded (Bot. Gaz. **13**: 29–32. 1888) the occurrence of 3 and 4 spores in the ascus in some American specimens.

U. verniciferae P. Henn. (on *Rhus vernicifera*, Tokio). The specimen sent is too immature to enable me to give a full description of the plant. It appears, however, a distinct species, showing affinity with *U. Sengokui*, but differing in the thicker-walled appendages, slightly narrowed upwards to the closely coiled frequently helicoid apex.

Dr. Hennings has also sent me an interesting form of *Erysiphe polygoni* on *Actinostemma racemosum*. This is remarkable in having the perithecia more or less imbedded in the persistent mycelium. Similar forms occur in Japan on *Diervilla Japonica* and *Paeonia obovata*.

The example of *M. alni* sent by Professor Hori on *Styrax Japonicum* from Tokio, Akabane (coll. Nambu and Nishida) is instructive in showing the variation that occurs in this species in the mode of branching of the apex of the appendages. In this specimen appendages may be found on the same perithecium with long or short primary branches (Figs. 25 and 26).

The occurrence of *Uncinula salicis* var. *Miyabei* on *Tilia Migueliana* is extremely interesting. The specimen was sent by Professor Miyabe, from Hokkaido, Prov. Ishikari, Shintotsugawa (coll. T. Kawakami) and agrees well with the original examples on *Alnus incana* and *A. maritima*. Professor Hori has sent specimens on the last named host from Tokio, Todamura under the MSS. name of *Uncinula aggregata*. It is possible that the present plant will prove to be specifically disinct from *U. salicis*.

I give below the distribution of the species of the Erysiphaceae occurring in Japan.

Erysiphe cichoracearum.—Europe (throughout); Africa (Algeria, Egypt); Asia (Persia, Turkestan, Siberia (Minussinsk)); New Zealand; North America (United States (throughout) and Canada (Ontario, New Brunswick, Newfoundland)).

E. galeopsidis.—Europe (throughout); Asia (Turkestan, Siberia (Minussinsk)); North America (United States (throughout) and Canada (Ontario, Newfoundland)).

E. graminis.—Europe (throughout); Africa (Algeria); Asia (Cyprus, Transcaucasia, Persia, Turkestan, Siberia (Minussinsk)); Australia (South, Victoria and New South Wales); North America (United States (throughout) and Canada (Ontario, Newfoundland)).

E. polygoni.—Europe (throughout); Africa (Canaries, Algeria); Asia (Transcaucasia, Turkey, Persia, Turkestan, India, Siberia (Minussinsk)); Australia (Victoria); New Zealand; North America (United States (throughout) and Canada (Manitoba, Ontario, New Brunswick)).

Microsphaera alni.—Europe (throughout); Asia (Transcaucasia); North America (United States (throughout) and Canada (Manitoba, Ontario, New Brunswick)).

M. berberidis.—Europe (throughout); Asia (Cyprus, Transcaucasia, Turkestan).

M. grossulariae.—Europe (throughout); North America (United States (throughout)).

Phyllactinia corylea.—Europe (throughout); Africa (Algeria); Asia (Transcaucasia, Turkey, Siberia (Minussinsk), China (Yunnan)); North America (United States (throughout) and Canada (Ontario, Newfoundland); Central America (Guatemala); South America (Paraguay, Patagonia).

Podosphaera leucotricha.—Europe (probably widely spread; recorded from Germany, Austria–Hungary and Russia); North America (United States (Vermont, Wisconsin, Iowa, Missouri, Kansas, Mississippi)).

P. oxyacanthae.—Europe (throughout); Africa (Algeria); Asia (Siberia (Minussinsk)); North America (United States (throughout), and Canada (Ontario, New Brunswick), Greenland.

P. oxyacanthae var. *tridactyla.*—Europe (throughout); North America (Washington (State)).

Sphaerotheca humuli.—Europe (throughout); Africa (Algeria); Asia (Transcaucasia, Turkestan, Siberia (Minussinsk)); North America (United States (throughout), and Canada (Ontario, New Brunswick, Newfoundland).

S. humuli var. *fuliginea.*—Europe (throughout). Asia (Turkestan, Siberia (Minussinsk)); North America (United States (throughout), and Canada (Ontario, New Brunswick)).

Uncinula aceris.—Europe (throughout); Asia (Transcaucasia).

U. australiana.—Australia (New South Wales).

U. clandestina.—Europe (not recorded farther east than Austria-Hungary and Poland); Africa (Algeria).

U. Clintonii.—North America (United States, widely spread in the Eastern States, but not recorded further west than Minnesota).

U. necator.—Europe (widely spread in the conidial state (*Oidium Tuckeri*), perithecia recorded from France only); North America (United States (throughout) and Canada (Ontario), with perithecia).

U. polychaeta.—Asia (China, (Yunnan)); North America (United States (South Carolina, Alabama, Mississippi)); South America (Argentine (Buenos Ayres)).

U. salicis.—Europe (throughout); Asia (Transcaucasia, India, Siberia (Minussinsk), China (Yunnan)); North America (United States (throughout)) and Canada (Ontario, Quebec).

According to their distribution the Japanese species may be arranged in the following six classes:

1. Cosmopolitan species: *Erysiphe cichoracearum*, *E. galeopsidis*, *E. graminis*, *E. polygoni*, *Microsphaera alni*, *Phyllactinia corylea*, *Podosphaera oxyacanthae*, *Sphaerotheca humuli* and var. *fuliginea*, *Uncinula salicis*.

2. European and North American species, recorded in Asia from Japan only: *Microsphaera grossulariae*, *Podosphaera leucotricha*, *P. oxyacanthae* var. *tridactyla*, *Uncinula necator*.

3. Old World species (*a*) European and Asiatic: *Microsphaera berberidis*, *Uncinula aceris*; (*b*) European and African: *Uncinula clandestina*.

4. American species: *Uncinula Clintonii* (United States (Eastern States)); *U. polychaeta* (found in China also) (United States (Eastern States) and South America).

5. Australian species: *Uncinula australiana*.

6. Species known only from Japan: *Uncinula fraxini*, *U. Sengokui*, *U. salicis* var. *Miyabei* (see also *U. verniciferae*, p. 440).

The following is an alphabetical list of the Japanese species, with their host-plants and localities. Appended to this is a host index.

ERYSIPHE CICHORACEARUM DC.

On *Laportea bulbifera*, Yoichi, Prov. Shiribeshi (G. Yamada); on *Plantago Kamtschatica* Zenibako, Prov. Shiribeshi, and Shiriuchi, Prov. Oshima (K. Miyabe); on *P. major* var. *Asiatica*, Sapporo (K. Miyabe), Zenibako, Prov. Shiribeshi, and Saruru, Prov. Hidaka (E. Tokubuchi), Otaru, Prov. Shiribeshi (T. Nishida), Satsukari, Prov. Oshima, and Wakkanai, Prov. Kitami (K. Miyabe); on *Artemisia vulgaris*, Sapporo (K. Miyabe & E. Tokubuchi), Otaru, Prov. Shiribeshi (T. Nishida), Kamoikotan, Prov. Ishikari (K. Miyabe); on *A. Japonica*, Sapporo (E. Tokubuchi & T. Nishida).

E. GALEOPSIDIS DC.

On *Lamium album*, Inantoge, Prov. Shiribeshi (G. Yamada), Morioka, Prov. Rikuchu (Y. Takahashi), Sapporo (Y. Tokubucho & K. Miyabe), Satsukari and Taniyoshi, Prov. Oshima (K. Miyabe); on *Chelonopsis moschata*, Shikabe, Prov. Oshima (K. Miyabe), Ozawamura, Prov. Shiribeshi (G. Yamada); on *Stachys aspera* var. *Japonica*, Sapporo (E. Tokubuchi), Sunagawa, Prov. Ishikari (K. Miyabe).

E. GRAMINIS DC.

On *Hordeum vulgare*, Kyoto (N. Hiratsuka), Sapporo (G. Yamada & N. Hiratsuka), Mombetsu, Prov. Iburi and Iwanai, Prov. Shiribeshi, Hokkaido (G. Yamada); Tokio, Nishigahara (S. Hori), Hondō, Prov. Owari, Chita (Tokubuchi).

E. POLYGONI DC.

On *Elsholtzia cristata*, Sapporo (K. Miyabe, G. Yamada & E. Tokubuchi); on *Scutellaria scordiifolia*, Sapporo (K. Miyabe); on *Aconitum Fischeri* (*A. Kamtschaticum*), Toshimoi, Etrup Isl., Kuriles (T. Kawakami), Saruru, Prov. Hidaka, Hokkaido (E. Tokubuchi), Zenibako, Prov. Shiribeshi, Hokkaido (K. Miyabe); on *Polygonum aviculare*, Zenibako, Prov. Shiribeshi (K. Miyabe), Sapporo (G. Yamada); on *Fagopyrum esculentum*, Sapporo (G. Yamada), on *Pilea stipulosa* (*P. petiolaris*), Sapporo (K. Miyabe); on *Saxifraga cortusaefolia*, Sapporo (E. Tokubuchi); on *Diervilla Japonica*, Sapporo (N. Hiratsuka & K. Miyabe); on *Paeonia obovata*, Sapporo (E. Tokubuchi & K. Miyabe); on *Thalictrum minus* var. *elatum*, Abashiri, Prov. Kitami, Hokkaido (K. Miyabe); on *T. aquilegifo-*

lium, Okushiri Island, Hokkaido (K. Miyabe); on *Clematis fusca* var. *Yezoensis*, Sorachibuto, Prov. Ishikari, Hokkaido (K. Miyabe); on *Amphicarpaea Edgeworthii*, var. *Japonica*, Nagasaki (G. Kurosawa), Otaru, Prov. Shiribeshi and Sapporo (K. Miyabe), Tokio, Akabane (S. Hori); on *Astragalus reflexistipulus*, Sapporo, Hokkaido (K. Miyabe); on *Vicia Cracca*, Sapporo (K. Miyabe), Obashiri, Prov. Kitami, Hokkaido (K. Miyabe), Abuta, Prov. Iburi, Hokkaido (K. Miyabe), Ishizaki, Prov. Oshima, Hokkaido (K. Miyabe); on *Peucedanum terebinthaceum*, Sapporo (E. Tokubuchi); on *Caucalis Japonica*, Mombetsu, Prov. Iburi, Hokkaido (K. Miyabe), Sapporo (E. Tokubuchi); on *Vicia unijuga*, Sapporo (E. Tokubuchi & G. Yamada); on *Caltha palustris*, Kutchau, Prov. Iburi, Hokkaido (G. Yamada); on *Quercus glauca*, Kyoto (T. Nishida); on *Sedum Telephium* var. *purpureum*, Sapporo (cult.) (G. Yamada).

MICROSPHAERA ALNI (Wallr.) Salm.

On *Corylus rostrata* var. *Mandshurica*, Otaru, Prov. Shiribeshi, Hokkaido (K. Miyabe & E. Tokubuchi); on *Quercus dentata*, Sapporo (K. Miyabe & G. Yamada); on *Q. crispula*, Sapporo (K. Miyabe), Noboribetsu, Prov. Iburi (T. Kawakami); on *Alnus incana*, near Morioka, Prov. Rikuchu (Y. Takahashi); on *Cornus macrophylla*, Makomonoi, near Sapporo (K. Miyabe), Utashinai, Prov. Ishikari (E. Tokubuchi); on *Picrasma quassioides* (*P. ailanthoides*), Sapporo (N. Hiratsuka, Y. Takahashi & G. Yamada); on *Castanea vulgaris* var. *Japonica*, Temya and Otaru, Prov. Shiribeshi, Hokkaido (K. Miyabe), Sapporo (E. Tokubuchi), Morioka, Prov. Rikuchu (Y. Takahashi); on *Ligustrum medium*, Sapporo (E. Tokubuchi); on *Syringa Amurensis* var. *Japonica*, Chubetsu, Prov. Ishikari (K. Miyabe); on *Schizandra Chinensis*, Sapporo (K. Miyabe & E. Tokubuchi); on *Styrax Japonicum*, Tokio, Akabane (Nambu & Nishida).

M. BERBERIDIS (DC.) Lév.

On *Berberis vulgaris*, Esashi, Prov. Oshima (K. Miyabe), Okushiri Isl., Hokkaido (K. Miyabe), Samani, Prov. Hidaka, Hokkaido (E. Tokubuchi).

M. GROSSULARIAE (Wallr.) Lév.

On *Sambucus racemosa*, Tokio, Akabane (Nishida & Nambu); on *S. racemosa* var. *pubescens*, Abuta, Prov. Iburi (K. Miyabe), Sapporo (G. Yamada).

PHYLLACTINIA CORYLEA (Pers.) Karst.

On *Amelanchier Asiatica*, Ujina, by the Inland Sea (H. Kawakami); on *Magnolia Kobus*, Sapporo (G. Yamada & E. Tokubuchi), Tokio (S. Hori); on *Actinidia arguta*, Sapporo (E. Tokubuchi & G. Yamada); on *Broussonetia papyrifera*, Komaba, Tokio (K. Sengoku); on *Hamamelis Japonica*, near Morioka, Prov. Rikuchu (Y. Takahashi); on *Betula alba*, Sapporo (N. Hiratsuka); on *Alnus incana*, Sapporo (G. Yamada); on *A. incana* var. *glauca*, Tokio, Komaba (S. Hori); on *A. maritima* (*A. Japonica*), Sapporo (K. Miyabe), Saitama-Ken, Omiya (S. Hori); on *Paulownia imperialis*, Hirosaki, Prov. Rikuoku (N. Hiratsuka), Matsuyama, Prov. Iyo, Isl. Shakoku (K. Okudaira), Saitama-Ken, Urawa (S. Hori); on *Morus alba*, Sapporo (E. Tokubuchi) (K. Miyabe), Shinotsu, Prov. Ishikari (G. Yamada), Tokio (S. Hori); on *Fraxinus Mandshurica*, Sapporo (N. Hiratsuka).

PODOSPHAERA LEUCOTRICHA (Ell. & Everh.) Salm.

On *Pyrus Sieboldi* (*P. Toringo*), Sapporo (K. Miyabe).

P. OXYACANTHAE (DC.) de Bary

On *Spiraea betulifolia*, Sapporo (Bot. Gardens) (K. Miyabe).

P. OXYACANTHAE var. TRIDACTYLA (Wallr.) Salm.

On *Prunus communis*, Sapporo (G. Yamada & E. Tokubuchi) Otaru, Prov. Shiribeshi, Hokkaido (K. Miyabe).

SPHAEROTHECA HUMULI (DC.) Burr.

On *Epilobium* sp., Etrup Isl., Kuriles (T. Kawakami); on *E. cephalostigma*, Ozawamura, Prov. Shiribeshi (G. Yamada); on *Potentilla fragarioides*, Samani, Prov. Hidaka, Hokkaido (E. Tokubuchi), Kumaishi, Prov. Oshima, Yozo (K. Miyabe), Sapporo (K. Miyabe), on *Spiraea Kamtschatica*, Sapporo (K. Miyabe), Garugawa, Prov. Ishikari (K. Miyabe), Shiriuchi, Prov. Oshima, Hokkaido (K. Miyabe); on *S. Aruncus*, Sapporo (K. Miyabe);

on *Poterium tenuifolium*, and var. *album*, Sapporo (K. Miyabe); on *P. officinale* var. *carneum*, Saruru, Prov. Hidaka, Hokkaido (E. Tokubuchi), Sapporo (K. Miyabe); on *P. Canadense* var. *medium*, Zuwosan, Prov. Iwaki (K. Miyabe); on *Geranium Nepalense*, Kami-iso, Prov. Oshima, Hokkaido (K. Miyabe) ; on *Agrimonia Eupatoria*, Mombetsu, Prov. Iburi, Hokkaido (K. Miyabe), Sapporo (G. Yamada); on *Spiraea Thunbergii*, Morioka, northern part of Main Island, Hondo (Y. Takahashi).

S. HUMULI var. FULIGINEA (Schlecht.) Salm.

On *Ajuga ciliata*, Sapporo (E. Tokubuchi); on *Calamintha Chinensis*, Sapporo (K. Miyabe); on *Siegesbeckia orientalis*, Sapporo (Takahashi & Hiratsuka); on *Cnicus Weyrichii* var. *Grayanum*, Sapporo (G. Yamada); on *Carpesium abrotanoides*, Sapporo (G. Yamada); on *Arctium majus*, Sapporo (K. Miyabe & E. Tokubuchi); on *Lactuca Raddiana*, Sapporo (K. Miyabe); on *Impatiens Noli-tangere*, Sapporo (E. Tokubuchi & K. Miyabe); on *I. Textori*, Sapporo (K. Miyabe & G. Yamada): on *Adenocaulon bicolor* (*A. adhaerescens*), Saruru, Prov. Hidaka, Hokkaido (E. Tokubuchi), Abuta, Prov. Iburi, Hokkaido (K. Miyabe); Sapporo (G. Yamada); on *Lactuca brevirostris* (*L. squarrosa*), Morioka, Prov. Rikuchu (Y. Takahashi); on *Fatoua pilosa* var. *subcordata*, Nagasaki (G. Kurosawa).

UNCINULA ACERIS (DC.) Sacc.

On *Acer pictum*, Sapporo (G. Yamada & K. Miyabe), Sugamo, Tokio (S. Hori) ; on *A. spicatum* var. *Ukurunduense* (G. Yamada).

U. AUSTRALIANA McAlp.

On *Lagerstroemia Indica*, Tokio (S. Hori) ; Sendai (K. Miyabe & K. Sengoku), Nishigahara, Tokio (S. Hori).

U. CLANDESTINA (Biv. Bern.) Schroet.

On *Ulmus campestris*, Sapporo (Takahashi & Hiratsuka) ; on *U. parviflora*, Hondo, Prov. Mino, Gifu (E. Tokubuchi).

U. CLINTONII Peck

On *Aphananthe aspera*, Tokio (K. Sengoku & K. Miyabe) ; on *Zelkova acuminata* (*Z. Keaki*), Kobe (K. Miyabe) ; on *Celtis Sinensis*, Tokio, Akabane (Nishida & Nambu).

U. FRAXINI Miyabe MSS. Salm.

On *Fraxinus longicuspis*, Sapporo (K. Miyabe).

U. NECATOR (Schwein.) Burr.

On *Actinidia polygama*, Okushiri Isl., Prov. Shiribeshi, Hokkaido (K. Miyabe), Samani Sando, Prov. Hidaka, Hokkaido (E. Tokubuchi) ; on *A. arguta*, Sapporo (K. Miyabe) ; on *A. Kolomikta*, Yubari, Prov. Ishikari, Hokkaido (E. Tokubuchi).

U. POLYCHAETA (Berk. & Curt.) Ell.

On *Aphananthe aspera*, Tokio (K. Sengoku), Hondo, Gifu (E. Tokubuchi) ; on *Celtis Sinensis*, Tokio, Sugamo (S. Hori).

U. SALICIS (DC.) Karst.

On *Salix viminalis*, Sapporo (E. Tokubuchi) ; on *S. daphnoides* (*S. acutifolia*), Sapporo (E. Tokubuchi) ; on *S. stipularis*, Sapporo (E. Tokubuchi) ; on *S. Caprea*, Sapporo (G. Yamada) ; on *S. Urbaniana*, Sapporo (N. Hiratsuka) ; on *S. gracilistyla* (*S. Thunbergiana*), Shibuya, Tokio (S. Hori) ; on *Populus balsamifera*, Sapporo (K. Miyabe) ; on *P. suaveolens*, Sapporo (K. Miyabe) ; on *P. tremula*, Abashiri, Prov. Kitami, Hokkaido (J. Tanaka).

U. SALICIS var. MIYABEI Salm.

On *Alnus incana*, Sapporo (G. Yamada) ; on *A. maritima* (*A. Japonica*), Sapporo (K. Miyabe), Tokio, Todamura (S. Hori) ; on *Tilia Migueliana*, Hokkaido, Prov. Ishikari, Shintotsugawa (T. Kawakami).

U. SENGOKUI Salm.

On *Celastrus articulatus*, Komaba, Tokio (K. Sengoku).

HOST INDEX

Acer pictum, spicatum var. Ukuruduense	U. aceris.
Aconitum Fischeri (Kamtschaticum)	E. polygoni.
Actinidia arguta	P. corylea and U. necator.
A. Kolomikta, polygama	U. necator.
Actinostemma racemosum	E. polygoni.
Adenocaulon bicolor (adhaerescens)	S. humuli var. fuliginea.
Agrimonia Eupatoria	S. humuli.
Ajuga ciliata	S. humuli var. fuliginea.
Alnus incana	U. salicis var. Miyabei, M. alni and P. corylea.

A. incana var. glauca	P. corylea.
A. maritima (Japonica)	P. corylea and U. salicis var. Miyabei.
Amelanchier Asiatica	P. corylea.
Amphicarpaea Edgeworthii var. Japonica	E. polygoni.
Aphananthe aspera	U. polychaeta and U. Clintonii.
Arctium majus	S. humuli var. fuliginea.
Artemisia Japonica, vulgaris	E. cichoracearum.
Astragalus reflexistipulus	E. polygoni.
Berberis vulgaris	M. berberidis.
Betula alba	P. corylea.
Broussonetia papyrifera	P. corylea.
Calamintha Chinensis	S. humuli var. fuliginea.
Caltha palustris	E. polygoni.
Carpesium abrotanoides	S. humuli var. fuliginea.
Castanea vulgaris var. Japonica	M. alni.
Caucalis Japonica	E. polygoni.
Celastrus articulatus	U. Sengokui.
Celtis Sinensis	U. Clintonii and U. polychaeta.
Chelonopsis moschata	E. galeopsidis.
Clematis fusca var. Yezoensis	E. polygoni.
Cnicus Weyrichii var. Grayanum	S. humuli var. fuliginea.
Cornus macrophylla	M. alni.
Corylus rostrata var. Mandshurica	M. alni.
Diervilla Japonica	E. polygoni.
Elsholtzia cristata	E. polygoni.
Epilobium cephalostigma	S. humuli.
Fagopyrum esculentum	E. polygoni.
Fatoua pilosa var. subcordata	S. humuli var. fuliginea.
Fraxinus longicuspis	U. fraxini.
F. Mandshurica	P. corylea.
Geranium Nepalense	S. humuli.
Hamamelis Japonica	P. corylea.
Hordeum vulgare	E. graminis.
Humulus Lupulus	S. humuli.
Impatiens Balsamina, Noli-tangere, Textori	S. humuli var. fuliginea.
Lactuca brevirostris (squarrosa), Raddiana	S. humuli var. fuliginea.
Lagerstroemia Indica	U. australis.
Lamium album	E. galeopsidis.
Lapartea bulbifera	E. cichoracearum.
Ligustrum medium	M. alni.
Magnolia Kobus	P. corylea.
Morus alba	P. corylea.
Paeonia obovata	E. polygoni.
Paulownia imperialis	P. corylea.
Peucedanum terebinthaceum	E. polygoni.
Picrasma quassioides	M. alni.

Pilea stipulosa (petiolaris)	E. polygoni.
Plantago Kamtschatica, major var. Asiatica	E. cichoracearum.
Polygonum aviculare	E. polygoni.
Populus balsamifera, suaveolens, tremula	U. salicis.
Potentilla fragarioides	S. humuli.
Poterium Canadense var. medium, officinale var. carneum, tenuifolium and var. album	S. humuli.
Prunus communis	P. oxyacanthae var. tridactyla.
Pyrus Sieboldi (Toringo)	P. leucotricha.
Quercus crispula, dentata	M. alni.
Q. glauca	E. polygoni.
Rhus vernicifera	U. verniciferae (see p. 440).
Salix Caprea, daphnoides, gracilistyla, purpurea, stipularis, Urbaniana, viminalis	U. salicis.
Sambucus racemosa and var. pubescens	M. grossulariae.
Saxifraga cortusaefolia	E. polygoni.
Schizandra Chinensis	M. alni.
Scutellaria scordiifolia	E. polygoni.
Sedum Telephium var. purpureum	E. polygoni.
Siegesbeckia orientalis	S. humuli var. fuliginea.
Spiraea Aruncus	S. humuli.
S. betulifolia	P. oxyacanthae.
S. Kamtschatica, Thunbergii	S. humuli.
Stachys aspera var. Japonica	E. galeopsidis.
Styrax Japonicum	M. alni.
Syringa Amurensis var. Japonica	“
Thalictrum aquilegifolium, minus var. elatum	E. polygoni.
Tilia Migueliana	U. salicis var. Miyabei.
Ulmus campestris, parvifolia	U. clandestina.
Vicia Cracca, unijuga	E. polygoni.
Zelkova acuminata (Keaki)	U. Clintonii.

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Explanation of Plate 26

(Unless otherwise stated, all figures are magnified 400 times.)

FIGS. 1–12. *Uncinula Kusanoi* H. & P. Syd., from an authentic specimen; 1, 2, perithecia, × 150; 3, cells of outer wall of perithecium; 4–7, appendages; 8–10 asci; 11, 12, spores.

FIGS. 13, 14. *U. Clintonii* Peck, from specimens collected at Crawfordsville, Ind., U. S. A. (E. M Fisher) (Ex Herb. U. S. Dept. Agric., no. 1055); 13, perithecium, × 150; 14, appendage.

FIGS. 15–17. *U. Clintonii* Peck, from specimens collected at Washington, D. C. (P. Magnus); 15, perithecium, × 150; 16, appendage; 17, ascus.

FIGS. 18-23. *U. Clintonii* Peck, from specimens collected at Winona, Minn. (J. M. Holzinger) (Ex Herb. U. S. Dept. Agric.); 18, perithecium, × 150; 19-22, appendages; 23, ascus and spores.

FIG. 24. *Microsphaera Japonica* P. Henn.; apex of mature appendage.

FIGS. 25, 26. *M. alni* (Wallr.) Salm., from specimens collected at Akabane, Tokio (Nambu & Nishida) on *Styrax Japonicum*; apex of two appendages from the same perithecium.